IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Patrick Johannes Blom et al.
Serial No.:	10/069,263
Art Unit:	1774
Filed:	June 19, 2002
Title:	TRANSFER LABEL
Examiner:	Tamra L. Dicus
Docket No.:	34434

DECLARATION OF PATRICK JOHANNES BLOM

Patrick Johannes Blom declares as follows.

1. I presently reside at Jan Keldermansstraat 9, 2321 EZ Leiden, The Netherlands.

2. I am one of the inventors in the above-referenced U.S. Patent Application Serial No. 10/069,263, filed on June 19, 2002.

3. My educational background is as follows: MSc in Environmental Chemistry, Rijks Universiteit Leiden, located at Leiden, The Netherlands, 1992.

4. My work experience and training is as follows: 1992-1993 Royal Dutch Shell Exploration Laboratories. Since 1993 I have worked for Heineken Technical Services B.V., the assignee of the above-referenced patent application, the first three years in Detachment from Randstad BV. My function within Heineken Technical Services is Scientist, specialist in decoration techniques and technologies. My duties for Heineken have included the development of different Image Transfer projects since 1996.

5. I am familiar with the subject matter of the above-referenced U.S. Patent Application Serial No. 10/069,263. As a co-inventor of the above-referenced patent application, I participated in the research and development leading up to the patent application and am familiar with the problems described in the patent application and also with the solution to those problems as set forth in the patent application, including the Examples set forth therein. The following statements are based upon this background and experience and my working in this field and my participating in the aforementioned research and development, including the Examples.

6. One embodiment of the present invention resides in using in the opaque layer a standard or conventional pigment, preferably TiO_2, and adding to that pigment a relatively small amount of aluminum powder. Thus, it is essential that there are a first pigment and the aluminum powder in the pigmented opaque layer. For the first pigment, zinc oxide or titanium dioxide may be used, although other pigments are suitable too. It is known in the art that, in order to try to obtain opacity, it is preferred to use pigments having as high a refractive index as possible, as this gives the best opaque properties (see for example the attached excerpt for the website of the Department of Polymer Science of the University of Southern Mississippi, wherein the background of this aspect of pigments is discussed).

7. Titanium dioxide has the highest refractive index (see attached chart) and is accordingly considered to be the best opacifying pigment. Zinc oxide is much lower and calcium carbonate has a refractive index that is in the order of magnitude of 1.5.

8. As has been described in the specification of my application and in the comparative example thereof, even with the best opacifying pigment, TiO_2, no acceptable hiding in the opaque layer could be obtained. Only when I made the unexpected and surprising discovery that by adding a small amount of aluminum powder to the existing opaque layer, a good quality opaque layer was obtained, without any problems with printing, due to the amount of solids in the opaque layer. The experiments which were conducted are described more in detail as follows.

9. Example 1 (Comparative Example)

A transfer label was prepared by rotogravure printing with the following sequence of layers printed onto a siliconised film of OPP:

1. Protective layer, comprising a transparent acrylic ink

2. One or more (up to eight) ink image layers, comprising of suitable pigmented inks or dyes

3. A first white pigmented layer containing white pigment in an acrylic binder. This white layer, as printed, contained 2 g/m^2 of white pigment, being exclusively TiO_2. The printing ink used for the printing of this layer consisted of 40 wt.% solvent and 60 wt.% solids, 40 wt.% of the solids was titanium dioxide and 60 wt.% of the solids was binder

4. A second white pigmented layer which was identical to the first white pigmented layer mentioned above

5. A binding layer, providing adhesion between the white pigmented layers and the adhesive layer.

6. A heat activatable adhesive layer

The label was then transferred onto the surface of a plastic bottle crate, over an existing silk screen printing. The result was then observed.

10. Example 2 (Example according to the invention)

1. Protective layer, comprising a transparent acrylic ink

2. One or more (up to eight) ink image layers, comprising of suitable pigmented inks or dyes

3. A first white pigmented layer containing white pigment in an acrylic binder. This white layer, as printed, contained 2 g/m^2 of white pigment, being exclusively TiO_2. The printing ink used for the printing of this layer consisted of 40 wt.% solvent and 60 wt.% solids, 40 wt.% of the solids was titanium dioxide and 60 wt.% of the solids was binder

4. A second white pigmented layer containing white pigment in an acrylic binder. This white layer, as printed, contained 2 g/m^2 of white pigment but the pigment was not exclusively TiO_2. The printing ink used for the printing of this layer consisted of 40 wt.% solvent and 60 wt.% solids, the solids was 60 parts binder, 40 parts TiO_2, and 0.6 parts aluminum powder.

5. A binding layer, providing adhesion between the white pigmented layers and the adhesive layer

6. A heat activatable adhesive layer

The label was then transferred onto the surface of a plastic bottle crate, over an existing silk screen printing. The result was then observed.

11. In Example 1 the two white layers each contained 2 g/m^2 of white pigment, (TiO_2), and thus the total amount of white pigment was 4 g/m^2. Even with this large amount of white pigment the pre-existing silk screen printing could be visually noticed through the label image.. Increase of the amount of pigment was not possible in light of the deterioration of printing and transfer characteristics.

12. In Example 2 the first white pigmented layer was the same as the first white pigmented layer of Example 1, but the second white pigmented layer contained a small amount of aluminum powder in addition to the basic amount of TiO_2. The second white pigmented layer contained 0.6 wt.% of aluminum powder, having a particle size of 15 μm, based on the weight of the said layer. The label was completely opaque and the existing printing could not be visually noticed through the label image. The printing and application characteristics were good.

13. The results of Examples 1 and 2 were surprising and unexpected to me. It was surprising and unexpected that the mere addition of a small amount of aluminum powder to a large amount of a conventional white pigment such as TiO_2 could have such a dramatic impact on

the hiding power of the opaque layers. It was surprising and unexpected that the addition of a small amount of aluminum powder could turn an opaque layer from one that could not hide an underlying image into one that could successfully and effectively hide an underlying image.

14. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the patent application or any patent issued thereon.

April 9, 2004
Date

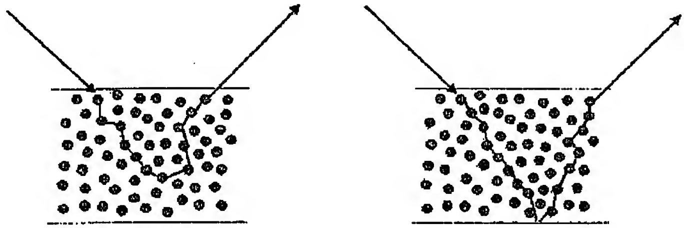
Patrick Johannes Blom

PIGMENTS

Pigments are what give coatings their beautiful colors. There are a wide variety of colors in coatings today so lets talk about the different types of pigments and how they are used. The main categories for the pigments used in coatings are inorganic, organic, metallic, and pearlescent. When choosing a pigment for a particular coatings some of the factors involved are:

- Refractive index
- Hiding efficiency
- Color
- pH
- Bulking value
- Density
- Hardness
- Oil absorption
- Impermeability (barrier properties)

The idea behind the pigment is to provide color and protect the substrate. To give color to a coating the pigment must create an opacity in the coating. When a coating is opaque the pigment particles present scatter and/or absorb light sufficiently to prevent it from reaching the substrate. Whether or not the pigment imparts opacity is dependant on two characteristic properties: refractive index and particle size. As you can see by the diagram below if the particles do not have a high refractive index, change the direction the light is traveling, there is insufficient hiding of the substrate. Therefore one can still see the substrate. There is a limit to the number of pigment particles in a coating based on the pigment volume concentration (PVC). This is why it is important to have pigment particles with a high refractive index.



Good hiding **Poor hiding**

Based on the refractive index pigments can be separated into two main categories: hiding and extender pigments.

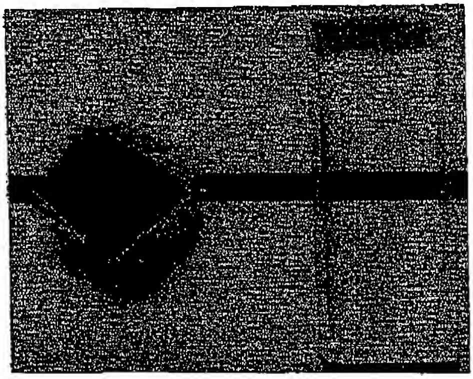
Hiding pigments:

These pigments possess refractive index values greater than 1.5. Examples of hiding pigments include titanium dioxide, zinc oxide, lithophone, and antimony oxide.

Extender pigments:

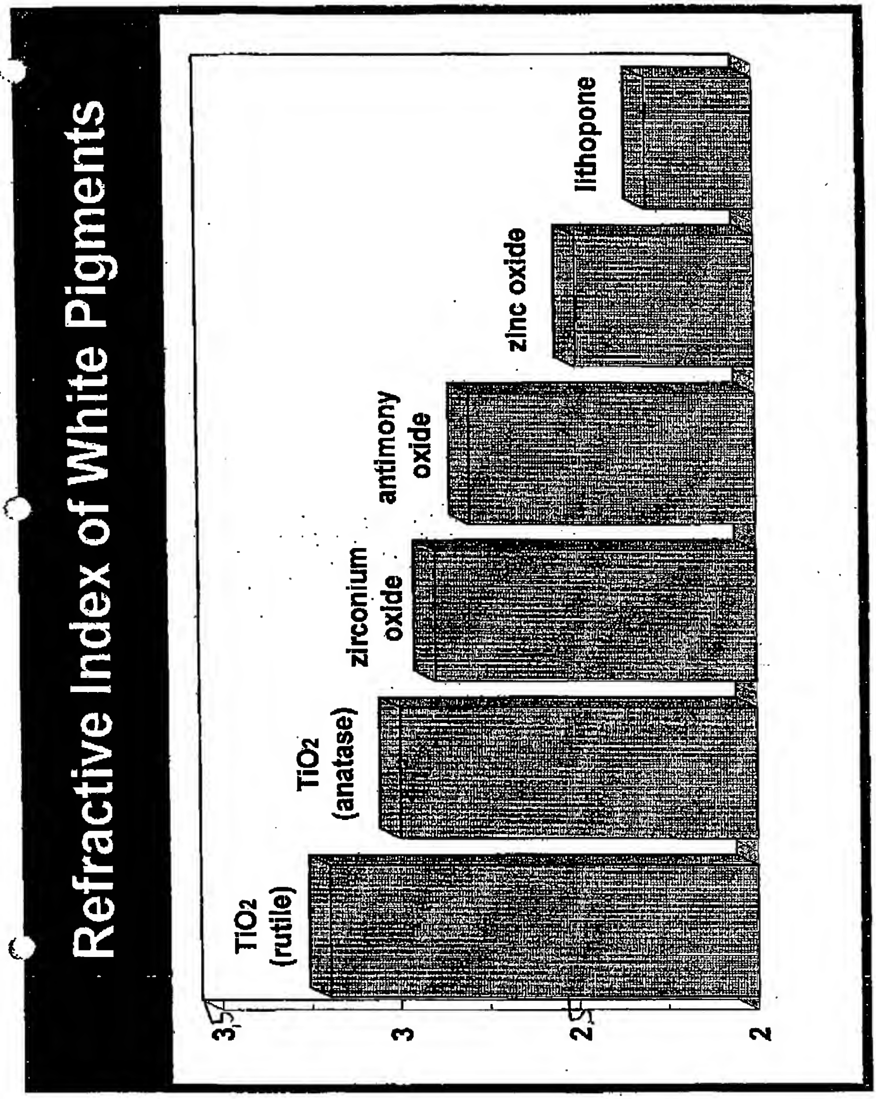
These pigments possess refractive index values close to 1.5. Examples of extender pigments include calcium carbonate, silicas, alkali and alkaline earth metal silicates, and barytes.

As said before particle size also has an effect on the effectiveness of the pigment. As the particle size of a pigment decreases, its opacifying ability increases. As shown figure below, a block of glass is transparent while a stack of thin glass slides of the same overall thickness has opacifying ability. Similarly, a large crystal of titanium dioxide appears colorless, but pigment grade titanium dioxide has good opacifying ability.



---

return to the Main page


Refractive Index of White Pigments
TiO2 (rutile)
TiO2 (anatase)
zirconium oxide
antimony oxide
zinc oxide
lithopone
3
3
2
2